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NOTES ON ODYNERUS WITH A KEY TO THE NORTH AMERICAN SUBGENERA AND DESCRIPTION OF A NEW SUBGENUS

(Hymenoptera, Vespidæ)

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Key to the Subgenera of Odynerus in North America

1. First abdominal sternite nearly flat, hardly as broad as its median length; head distinctly longer than broad as viewed from the front; second abdominal sternite without a median basal furrow.....*Dolichodynerus* Bohart
–. First abdominal sternite much broader than its median length 2
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–. Median length of second tergite less than twice that of second sternite 3
3. Front face of pronotum without a pair of distinct pits or impressed lines near the middle.....4
–. Front face of pronotum with two distinct pits or impressed lines near and on either side of the middle.....9
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–. First abdominal tergite without a transverse carina.....7
5. Second cubital cell of the forewing petiolate anteriorly..... .....*Alastoroides* Saussure
–. Second cubital cell of the forewing not petiolate; no pale markings in the emarginations of the eyes.....6
6. First abdominal tergite with a median longitudinal postsutural groove; first tergite without long erect hair; male antennæ thirteen-segmented, not hooked or rolled apically. .....*Symmorphus* Wesmæl
–. First tergite without a longitudinal groove, with long erect hair; male antennæ hooked apically.....*Ancistrocerus* Wesmæl
7. With a carina running from the pronotal angles obliquely to the mesothorax; propodeum usually bordered superiorly with prominent membranous ridges; male antennæ apparently eleven-segmented, the last two segments being minute..... .....*Pachodynerus* Saussure

–. Without a carina running from the pronotal angles obliquely to the mesothorax; male antennæ hooked apically.....8

8. Small species, often silvery-pubescent and marked with rufous; first abdominal tergite usually well punctured and often with the apical margin swollen; clypeus usually apically incised .....*Leptochilus* Saussure

–. Medium to large species; first tergite thinly margined apically and usually hardly punctured; clypeus rarely apically incised.....*Rygchium* Spinola

9. Pits on front face of pronotum linear and well separated; male antennæ usually coiled apically; markings often bright red in North American species; body form robust..... .....*Odynerus* Latreille

–. Pits on front face of pronotum close together and round or oval; male antennæ hooked apically; slender species.....10

10. Summit of first abdominal tergite with a shelf-like transverse carina.....*Parancistrocerus* Bequaert

–. Summit of first tergite without a shelf-like carina..... .....*Stenodynerus* Saussure

Subgenus LEPTOCHILUS Saussure

Leptochilus Saussure, 1852. Etud. Fam. Vesp., 1:233.
Parodynerus Saussure, 1856. Etud. Fam. Vesp., 3:245.
Microdynerus Thomson, 1874. Scandinaviens Hymenoptera, 3:58.
Zendalia Robertson, 1928. Flowers and Insects, p. 12 (erects new genus for *acolhuus* Sauss. and *zendaloides* Robt.).

Subgenotype: *Pterochilus mauretanicus* Lep.

The original generic description of Saussure was as follows:

"Lèvre longue, linéaire. Palpes labiaux sensiblement plus courts que la languette, de quatre articles, très grêles, presque glabres; le premier très long, le quatrieme très petit. Machoires et mandibules comme dans le genre *Pterochilus,* mais les palpes très grêles. Chaperon aussi large, ou plus large que long, arrondi en dessus. Le rest comme le genre en question."

The genus was erected by Saussure for *Pterochilus mauretanicus* Lep.; *Discoelius cruentatus* Brullé; *Odynerus oraniensis* Lep.; and *Leptochilus fallax* Sauss., *ornatus* Sauss., *parvulus* Sauss., and *exiguus* Sauss. In a recent paper Blüthgen has divided *Leptochilus* and *Microdynerus* into several genera and subgenera (Blüthgen, P., Beitrage zur Kenntnis der palaearktischen Eumeniden, *Deutsche Ent. Zeitschr.*, 1938:434-496). In the author's opinion Blüthgen has overemphasized species group differences, and the multiplicity of names which he has added tend to confuse rather than simplify the complex eumenine picture.

All intergrades occur between species typical of *Leptochilus* and those typical of *Microdynerus*. A comparison of the European type species, *O.* (*Microdynerus*) *exilis* Herrich-Schaeffer, with a variety of North American species leads the author to the conclusion that *Microdynerus* merely represents the less heavily sculptured *Leptochilus*.

When *Leptochilus* was placed in *Odynerus* by Dalla Torre, *ornatus* was preoccupied and the name *republicanus* was substituted for it. Apparently, this species has not been recognized since Saussure described it. However, the author has examined specimens of both sexes of a species which agrees exactly with the original description and figures. Moreover, this species, which is rare, appears to be the only one of its species group occurring in the locality designated by Saussure, *e. g.*, "Carolina." A redescription of this species is given below. The other species described by Saussure from "America," *fallax*, has never been identified with a North American species and, as Saussure himself suggested, probably was mislabeled.

Among the numerous species of North American *Leptochilus* are *O. rufinodus* Cr., *bellulus* Cr., *electus* Cr., *congressus* Vier., *rufobasilaris* Ashm., *fedorensis* Cam., *tosquineti* Cam., and *zendaloides* Robt.

Odynerus republicanus Dalla Torre

(Figs. 1-3)

Leptochilus ornatus Saussure, 1852, Etud. Fam. Vesp., 1:233, pl. 20, fig. 4 (nec Smith, 1852).

Odynerus republicanus Dalla Torre, 1889. Wien. Ent. Zeitsch., 8:125.

Male. Black; clypeus except apical margin, first antennal segment in front, pronotum anteriorly except at middle, mesopleural spot, tegula, two spots on scutellum, femora apically, outsides of tibiæ, apical margins of first two or three abdominal tergites and second sternite, yellow; mandible partly, first antennal segment behind, legs mostly, first abdominal segment except for apical margin, dark reddish; wings dark smoky, the veins black. Clypeus and emargination of compound eye weakly silvered; pubescence of head and thorax sparse, pale, and hardly longer than an ocellus; pubescence of abdomen minute, silvery. Body coarsely punctured, punctures almost contiguous; clypeus and front face of pronotum coarsely punctured; apical abdominal tergites with finer punctuation. Clypeus much broader than long, strongly convex in lateral

view, with a very small apical incision; mandible four-toothed; last antennal segment curved, finger-like, as long as tenth segment and reaching to its apex; inter-ocellar area with a pair of prominent tubercles; head greatly developed behind ocelli; postscutellum serrately crested; hind face of propodeum roundly concave; middle femur normal; abdomen short and stout (see fig. 2); second sternite without a median basal suture; length to apex of second tergite, 6.5 to 7.5 mm.

Female. Coloration, pubescence, and puncturation about as in male with the following exceptions: Clypeus dark yellow, red, and black. Clypeus weakly incised apically, once and two-thirds as broad as long; length to apex of second tergite, 8 mm.

Records. "Carolina" (male and female types, Paris Museum); one male, South Carolina, July; one female, Nelson County, Virginia, July 30, 1926 (W. Robinson); one female, Hilliard, Florida, August 19, 1930 (J. Nottingham); one male and one female, Fedor, Texas, April, 1899; one male, Medora, Kansas, June 24, 1926 (D. R. Lindsay); one female, Graham County, Kansas, August 16, 1912 (F. X. Williams).

Subgenus STENODYNERUS Saussure

(Fig. 13)

Stenodynerus Saussure, 1854. Melanges Hyménoptérologiques, fasc. 1:58.

Type by present designation, *Odynerus chinensis* Saussure.

The following is quoted from the original description of the subgenus:

"Formes du corps grêles, allongées. Thorax allongé. Abdomen souvent cylindrique; écusson aplati, métathorax convexe, creusé d'une fossette variable; à bords en général arrondis."

Of the two species included in the original description, *angustus* Sauss. and *chinensis* Sauss., the latter appears to be typical of North American species commonly placed in this subgenus by previous workers.

Stenodynerus probably contains more species than any other American subgenus. They are mostly small to medium sized, slender, and with the clypeus often longer than broad. The two distinct approximate pits on the front face of the pronotum are also characteristic of *Parancistrocerus*, and these two subgenera intergrade so that some species are difficult to place. A few species of *Stenodynerus* resemble certain *Leptochilus* closely and

apparently form an intermediate link between the two. In such cases the pronotal pits are the only means of separation. The following North American species are typical of *Stenodynerus*: *O. anormis* Say, *blandus* Sauss. (fig. 13), *taos* Cr., *cochisensis* Vier., *lucidus* Roh., *pedestris* Sauss., *toltecus* Sauss., and *fundatus* Cr.

Dolichodynerus Bohart, new subgenus

(Figs. 4-10)

Subgenotype, *Odynerus turgiceps* Bohart.

This subgenus contains the most elongate species of North American *Odynerus*. It is probably most closely allied to *Stenodynerus* and may possibly be a derivative of it. Only two species are known at present and both are rare in collections. Of these, *tanynotus* is the least modified. The greatly lengthened first sternite occurs in both species and readily separates the subgenus from all others in North America.

Body elongate; head distinctly longer than broad in front view; thorax strongly flattened dorsally and about twice as long in dorsal view as broad at the tegulæ; first abdominal segment about twice as long as its greatest thickness in lateral view, first sternite with its median length about as great as its breadth. Front face of pronotum coarsely punctured, without discrete pits, or with a single median pit. Female vertex without depression. Pronotal carina separated from mesonotum by more than three ocellus lengths. Second cubital cell of forewing strongly narrowed anteriorly. First abdominal tergite with rudiments of a transverse carina near its base; second sternite flattened basally and without a median furrow. Male antenna thirteen-segmented, apically hooked, last segment straight. Third segment of female antenna about one and one-third times as long as second. Male genitalia slender; ædeagus simple at apex, notched sub-basally; parameres simple, slender, and weakly haired.

Key to the Species of Dolichodynerus

With prominent smooth swellings behind and close to the compound eyes; edges of compound eyes at the emarginations distinctly above the level of the face at that point; second abdominal tergite not raised apically; apices of second and third tergites fitting against sub-basal carinæ on tergites three and four; coloration black and yellow.....*turgiceps*

Without swellings behind the compound eyes; edges of compound eyes on a level with the rest of the face at the emarginations; second tergite smoothly raised apically; no carinæ on tergites three and four; coloration largely red and yellow.....*tanynotus*

Odynerus turgiceps Bohart, new species

(Figs. 4-8)

Particularly remarkable are the sub-basal carinæ of the third and fourth tergites which prohibit the telescoping of these segments as in other *Odynerus*. This unique condition adds materially to the elongate appearance of the species.

Male. Black; first antennal segment in front, spot on mandible, clypeus mostly, frontal stripe, post-ocular spot, stripe across pronotum, mesopleural spot, spot on tegula, two spots on scutellum, elongate spot on propodeum laterally, outsides of tibiæ, crescent-shaped spot at center of basal third of first abdominal tergite, apical margins of first to fourth tergites and fourth to seventh sternites, lateral spots on second and third sternites, bright yellow; wings darkly brown-clouded especially along anterior third. Pubescence of entire body minute, less than one ocellus length. Puncturation of head, thorax, and first four abdominal segments coarse and close; clypeus less coarsely than front; front face of pronotum coarsely throughout; propodeum weakly striate; last two abdominal segments finely punctured. Clypeus roughly five-sided except for roundly incised apex; head depressed at emargination of compound eye to depth of an ocellus; with a pair of shining post-ocellar tubercles originating between hind ocelli; with two pairs of large post-ocular tubercles or humps; prothorax with a median longitudinal crease, with a sharp transverse anterior carina, sharply rounded pronotal angles, distance from carina to mesonotum about five ocellus lengths; posterior face of propodeum roundly concave, with rough dorsal edges; first abdominal tergite with a weak sub-basal carina, apex slightly raised; second tergite slightly constricted at basal third; third and fourth tergites with sub-basal carinæ which prevent their slipping under tergites two and three respectively; length to apex of second tergite, 6.5 mm.

Female. Markings, pubescence and puncturation about as in male with the following exceptions: Clypeus, antenna, hind tibia and last two abdominal sternites black; mandible and tarsi reddish-tinted. Second to fourth antennal segments with a length ratio of 3:4:3 respectively; mandible five-toothed, subapical tooth very weak; length to apex of second tergite, 7 mm.

Holotype, male, no. 4829, Calif. Acad. Sci., Ent., allotype, female, no. 4830, Calif. Acad. Sci., Ent., and one paratype, female, Sunset Valley, Santa Barbara County, California, July 14, 1938 (M. A. Cazier). Other paratypes, Arizona: One female, Santa Rita Mountains. California: One female, San Jacinto Mountains, July, 1912 (J. C. Bridwell); one female, La Crescenta, Los

Angeles County, August 7, 1938, on *Eriogonum* (C. Michener and R. Bohart); one female, Eagle Rock Hills, Los Angeles County, June 22, 1934 (C. D. Michener); one male, Glen Ivy, Riverside County, May 13, 1928, on *Eriogonum fasciculatum* (P. H. Timberlake); one female, Dos Palmos, Riverside County, March 28, 1934. Holotype and allotype in the California Academy of Sciences; paratypes in U. S. National Museum, and the respective collections of J. Bequaert, P. H. Timberlake, and the author.

Odynerus tanynotus Cameron

(Figs. 9-10)

Odynerus tanynotus Cameron, 1909. Pomona Jour. Ent., 1:133.

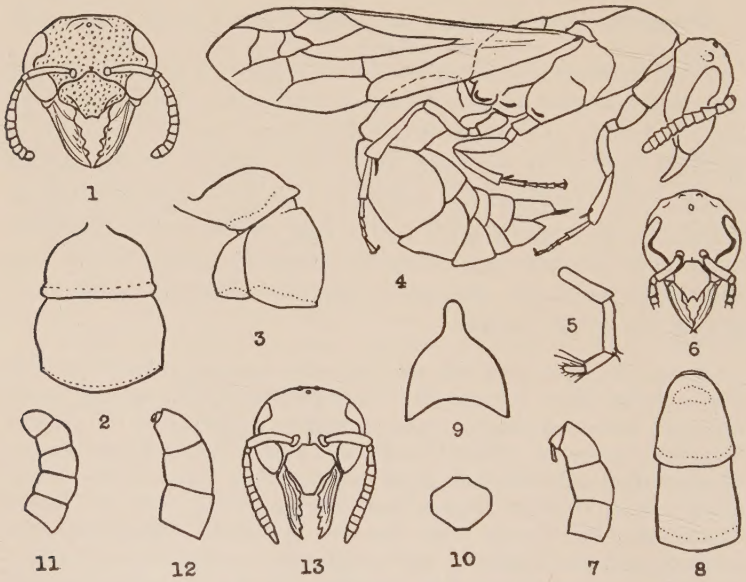
The most peculiar feature of this species is its long second abdominal tergite which, at rest, is half concealed beneath the first. By virtue of this fact it is able to bend its abdomen sharply at right angles by exposing the basal portion of the second tergite. This condition also occurs to a lesser extent in *turgiceps*. Although similar in general body shape to the latter, *tanynotus* can readily be distinguished by the characters given in the key. The following is an original descripton of the male and a redescription of the female.

Male. Black, extensively marked with varying amounts of yellow and red; head largely black and yellow, thorax largely black and red; abdomen largely red and yellow; clypeus, eye emargination, first antennal segment in front, frontal stripe, front margin of pronotum and scutellum posteriorly yellow; legs reddish, tinted with yellow on tibiæ. Pubescence obscure. Body, except for abdomen apically, closely and coarsely punctured. Mandible five-toothed; clypeus narrowly and angularly notched apically; last antennal segment longer than twelfth, last two segments together as long as eleventh; low, punctured, inter-ocellar tubercles present; distance from pronotal carina to mesonotum about four ocellus lengths; middle femur slightly depressed at its outside middle; first abdominal tergite roughened at base but without a distinct carina, first tergite enclosing about half of second tergite at rest; apex of second tergite smoothly raised; length to apex of second tergite, 8-9 mm.

Female. Markings, pubescence, and puncturation about as in the male with the following exceptions: Tendency toward suppression of black is greater; legs red. Mandible five-toothed; clypeus truncate apically (fig. 10); second to fourth antennal

segments with the length ratio of 4:5:4 respectively; length to apex of second tergite, 10-11 mm.

Records. California: One female, Dos Palmos, Riverside County, March 28, 1934. Arizona: One female, Congress (Cameron holotype); one male, Catalina Springs; one female, Patagonia; two females, Cave Creek, Chiricahua Mountains, July 4, 1930 (E. G. Linsley); one female, Tucson, August. New Mexico: One female, Las Cruces (T. D. A. Cockerell); two females, Alamagordo. Oklahoma: One male, Stillwater (C. Locke). Texas: One female, Uvalde; two males, Austin, April 12, 1902; one male, Laredo, May 10, 1924; one male, Cotulla, May 5, 1905 (W. D. Pierce).



Odynerus republicanus, fig. 1, front view of female head; fig. 2, dorsal view of tergites one and two; fig. 3, lateral view of first two abdominal segments. *O. turgiceps*, fig. 4, side view of female; fig. 5, female labial palpus; fig. 6, front view of female head; fig. 7, end of male antenna; fig. 8, dorsal view of tergites one and two. *O. tanynotus*, fig. 9, first sternite of female; fig. 10, female clypeus. *O.* (*Symmorphus*) *debilis*, fig. 11, segments 9-13 of male antenna. *O.* (*Pachodynerus*) *californicus*, fig. 12, segments 9-13 of male antenna. *O.* (*Stenodynerus*) *blandus*, fig. 13, front view of female head.

A NEW APHID OF THE GENUS MINDARUS FROM WHITE FIR IN BRITISH COLUMBIA

(Homoptera, Aphididæ)

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This species was collected on the undersides of the young, tender tips of grand fir or white fir, *Abies grandis* Lindley, growing along "The Gorge" just back of The Gorge Hotel in the City of Victoria, British Columbia, on June 7, 1938. The two trees infested were quite young and not over 20 feet tall. They were growing in the woods on the bank and were quite shaded by larger coniferous trees. My attention was attracted by the copious covering of honeydew on and under the infested trees and by the buzzing of insects feeding upon it. The flocculent aphids were crowded on the undersides of the needles with very little noticeable curling or deformation of the latter at the time. The material was gathered in a paper bag, and the specimens later removed to vials of 80 per cent alcohol. In making the transfer I noticed the four distinct forms: the alate and apterous parthenogenetic females, the apterous oviparous females, and the minute dusky-looking males. The shining black eggs, slightly covered with wax, were also quite abundant. Although many other trees in the vicinity were examined, no additional specimens were collected. However, I thought the species was *Mindarus abietinus* Koch and therefore made no special attempt to observe the habits of those collected or to find other colonies.

Mindarus victoria Essig, new species

Color. All forms, excepting the males, are a soft jade-green color which is hidden by heavy white waxy pulverulence or cottony secretions. The winged forms are characteristically dusky or black, including much of the head and thoracic regions and the rostrum, antennæ, legs, wing veins, three to five dorsal transverse abdominal vittæ, tip of the cornicles, and anal plate. In the cleared apterous parthenogenetic females the front of the head, portions of the antennæ, the legs, and glandular areas are faintly dusky.

The sexual females appear very much like the apterous parthenogenetic females with the additional circular pigmented areas between the cornicles which, in life, bear many closely clustered glass-like wax rods.

The cleared males appear to be largely dusky throughout, with transparent cross-lines between the abdominal segments.

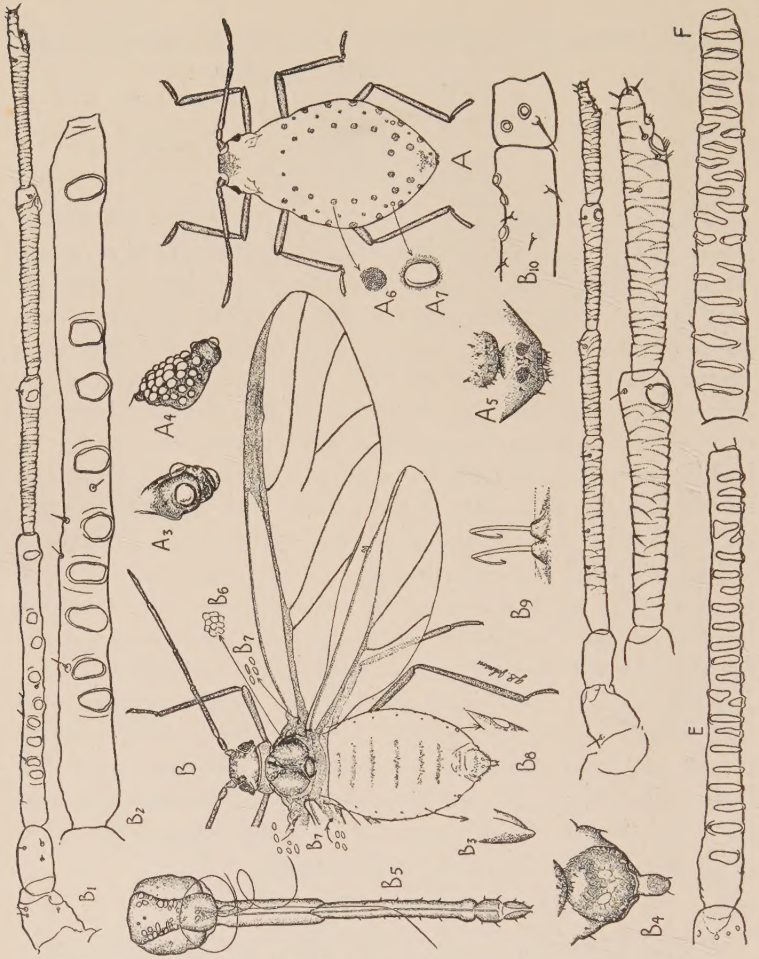

Fig. 1. *Mindarus victoria* Essig, n. sp. A, apterous viviparous female: A1, antenna; A2, segments V and VI of antenna further enlarged; A3, ocellanæ found in some individuals; A4, compound eye; A5, posterior abdominal region showing anal and genital areas and two groups of glands; A6, single wax glandular area greatly enlarged; A7, cornicle. B, winged viviparous female: B1, antenna; B2, antennal segment III; B3, abdominal tubercle; B4, ventral aspect of posterior abdominal region showing cauda, anal plate with two transparent circular areas, and portion of the genital plate; B5, rostrum; B6, reticulated derm of thoracic region; B7, fenestras at bases of subcostal veins; B8, cornicle; B9, hamuli or wing hooks, B10, sensoria on trochanter and at base of femur. E, *Mindarus abietinus* Koch: antennal segment III of the winged viviparous female. F, *Mindarus japonicus* Takahashi: antennal segment III of the winged viviparous female.

Winged viviparous female. Pulverulent or wholly covered with white cottony wax, jade-green with the head and thorax and their appendages, wing veins, tips of the cornicles, anal plate, genital plate, and abdominal vittæ dusky or black. Antennæ slightly more than half the length of the body; lengths of segments: I, 0.10 mm.; II, 0.10 mm.; III, 0.42 mm.; IV, 0.22 mm.; V, 0.27 mm.; VI, 0.25 mm. (base, 0.20 mm.; unguis, 0.05 mm.); total 1.36 mm. There is a wide range in the measurements of the different individuals examined. Large, nearly circular secondary sensoria occur on segments III and IV. On III there are from six to twelve with an average of eight or nine distributed throughout the length excepting the base. On IV there is normally but one large apical sensorium similar to the primary one on V. Only a few inconspicuous setæ are present. The rostrum is long and slender with the apical segments rather short and broad. It extends nearly to the third coxæ and averages 8 to 9 mm. in length. The cornicles are very short and little more than rings. Usually there are two sensoria on the trochanters and a row of three on the inner basal margin of the femora. The tarsi are conspicuously large and appear subequal on all the legs. Segment II is about eight times as long as I; total length to the bases of the claws is 0.23 mm. There is, on each side of the body, a row of small tubercles. The cauda is broad at the base and somewhat knobbed apically with the basal area transparent. There are a few short inconspicuous hairs present. The anal plate is nearly circular; pigmented with the exception of two large circular transparent areas, each of which has a single central seta. It is also beset with a considerable number of small setæ arising from nearly globular tubercles. The genital plate is elongated and also armed with a few setæ like those on the anal plate. Length of the body, 2.5 mm., width 0.9 mm.; length of forewing, 3.2 mm., width, 1.2 mm.

Apterous viviparous female. Pulverulent or waxy over jade green; the appendages being dusky or somewhat amber-colored. In most forms the eyes are compound but several mature individuals were noted which had only the two groups of three ocellanæ each as in the sexual forms. Lengths of the antennal segments: I, 0.09 mm.; II, 0.09 mm.; III 0.35 mm.; IV, 0.18 mm.; V, 0.18 mm.; VI, 0.21 mm. (base, 0.17 mm.; unguis, 0.04 mm.); total, 1.10 mm. There are no secondary sensoria present and but few inconspicuous setæ. Rostrum similar to that of the winged form. Cleared specimens reveal a considerable number of circular, wax glandular areas variable in size and arranged in a longitudinal marginal and submarginal row on each side with two extra areas between the cornicles. The marginal and the posterior submarginal areas are largest. Cornicles mere rings. The cauda appears to be incompletely developed or absent—the abdomen simply rounds off posteriorly. The anal and genital plates are similar to those of the alate form.

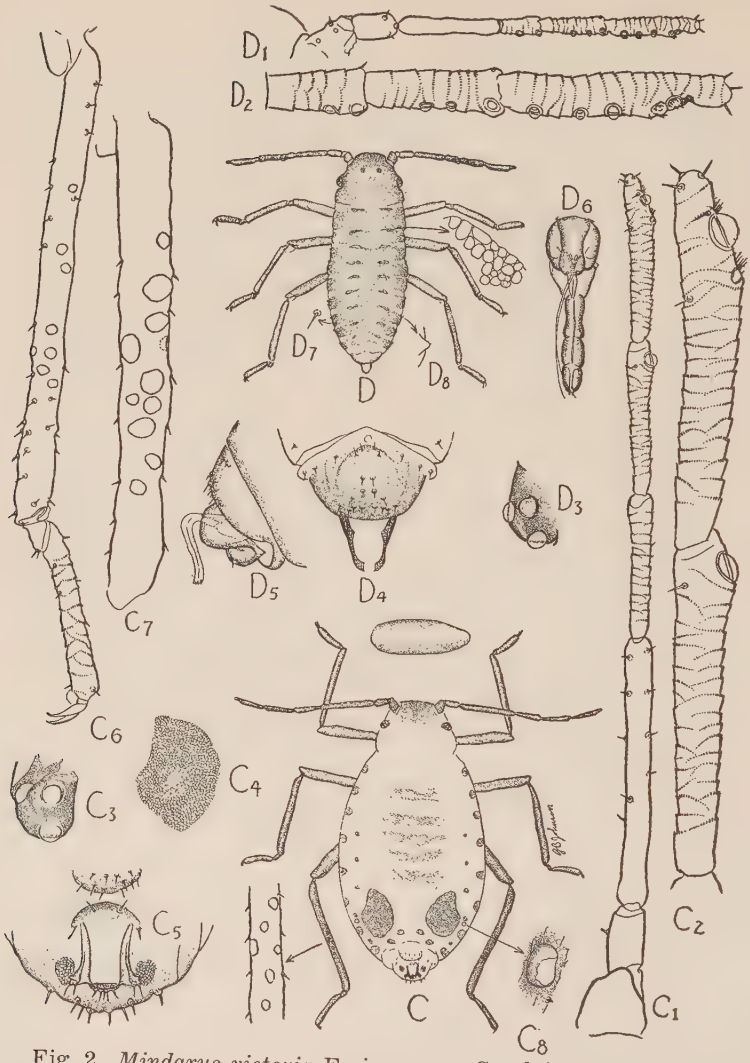

Fig. 2. *Mindarus victoria* Essig, n. sp. C, adult sexual female: C1, antenna; C2, segments V and VI of antenna; C3, group of ocellanæ; C4, one of the two large wax glandular areas between the cornicles; C5, anal area showing modified cauda, anal plate, genital plate, and wax glandular areas; C6, hind tibia and tarsus; C7, hind tibia of another individual; C8, cornicle. D, male: D1, antenna; D2, antennal segments IV to VI showing sensoria; D3, group of ocellanæ; D4, ventral aspect of anal area showing claspers, anal plate, and genital plate; D5, lateral view of anal area showing the exserted penis; D6, rostrum; D7, lateral body spine; D8, lateral body tubercle. (All drawings by aid of U. S. Works Progress Administration under supervision of author.)

Sexual oviparous female. Apterous and similar in form to the apterous viviparous female but considerably smaller in size and somewhat more yellow in color. The groups of glassy-wax rods between the cornicles and the smaller size of the bodies at once separate them in life, and the simple eyes, the large glandular areas from which the wax rods are secreted, the cleared sensoria-like areas on the hind tibiæ, and the small "u"-shaped chitinized caudal area at once distinguish the cleared, mounted specimens. The color is greenish-yellow with head and appendages dusky and a series of five or six dusky vittæ on the dorsum. The body has the two rows of oval or circular, glandular areas similar to those of the apterous viviparous forms. The anal and genital plates are not definitely pigmented but support similar setæ. The glandular patches between the cornicles are sometimes very large and indefinite in form. They each have a small clear circular area in the center. The eyes are each composed of three ocellanæ. Lengths of the antennal segments: I, 0.05 mm.; II, 0.06 mm.; III, 0.22 mm.; IV, 0.11 mm.; V, 0.13 mm.; VI, 0.15 mm. (base, 0.13 mm.; unguis, 0.02 mm.); total, 0.72 mm. There are no secondary sensoria present. The cauda is not distinct, if present at all. It is represented by a chitinized "u"-shaped area that, in some specimens, appears to define a cauda. Length quite variable—from 1.30 to 2.00 mm.

Male. Minute, dusky throughout and very inconspicuous. There are two longitudinal rows of groups of wax glands on the dorsum. Eyes are composed of three ocellanæ each. Antennæ about half the length of the body; lengths of segments: I, 0.05 mm.; II, 0.05 mm.; III, 0.10 mm.; IV, 0.05 mm.; V, 0.07 mm.; VI, 0.11 mm. (base 0.09 mm.; unguis 0.02 mm.); total 0.43 mm. Large and small circular secondary sensoria are distributed as follows: IV, 0 to 2; V, 1 to 3; VII, 2 to 3. Although there are certain light areas on III, they do not appear to be true sensoria. The rostrum extends beyond the hind coxæ and is similar in shape to the other forms. The hind tibiæ are not enlarged, but the margins are sometimes a little irregular because of the presence of the rather large oval or circular sensoria-like areas which number from 4 to 8. Other anatomical features are shown in the accompanying drawings in Figure 2.

Eggs. Regularly elongate-oval, shining black, and covered with waxy pulverulence and threads; length 0.65 mm. Laid on the undersides of the needles.

Type. A single alate viviparous female is designated as a type in the author's collection. A large series of slides of all the various forms described and taken from the original host and consisting of several hundred individuals are designated as paratypes. These are mounted on 31 slides in Canada balsam and 4 slides in a modified Berlese mounting medium. All are in the author's collection.

There are now four species referable to this genus: *Mindarus abietinus* Koch, *M. obliquus* Cholodkovsky (=*Schizoneura obliqua*), *M. japonicus* Takahashi, and *M. victoria* Essig, n. sp. The latter differs from all the others in the fewer and more circular sensoria on antennal segment III of the winged viviparous female as shown in the accompanying illustrations in Figure 1, B1, B2, E, and F. Cholodkovsky's[1] drawing of *obliqua* shows thirteen oval sensoria scattered over most of the length of the segment. He also shows three small sensoria on segment IV of the alate form instead of none or one as in the other species.

In *abietinus*[2] there are from fourteen to twenty-four and in *japonicus*[3] from nineteen to twenty-three elongated sensoria on segment III of the alate form. In the latter species there is a tendency for some of the sensoria to be shorter and staggered along the segment. Specimens of *abietinus* from Maine, received through Dr. E. M. Patch, show a more circular type than those from Europe or from California.

[1] Zoöl. Anz., XIX, p. 256, 1896.
[2] Die Pflanzenlause, p. 278, figs. 350, 351, 1857.
[3] Trans. Nat. Hist. Soc. Formosa, vol. XXI, pp. 137-139, figs. 1-2, 1931.

Notes on the Genus Amblycheila

(Coleoptera-Cicindelidæ)

Recent collections from Arizona and Southern California have yielded several specimens of this very rare and desirable genus and it seems appropriate at this time to present this additional data in order to aid future collectors who may be in the vicinity of the localities cited. Mr. R. P. Allen collected four female specimens of *Amblycheila picolominii* Rche. 20 miles east of Tuba City, Arizona, July 28, 1937, at dusk, in dry, open, rocky country. Mr. Thomas Rodgers collected one small female of the very rare *Amblycheila schwarzi* W. H. in Cedar Canyon, Providence Mountains, San Bernardino County, California, June 1, 1938, in a dry, sandy wash. This locality is approximately 150 miles southeast of the only other reported California locality which is Skidoo, Inyo County, California. The specimen was presented by Mr. D. F. Tillotsen, to whom the author is indebted for this fine addition.—Mont. A. Cazier.

THE MULLEIN THRIPS

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The mullein thrips, *Neoheegeria verbasci* (Osborn), is a common thrips in central Europe and North America. Since 1888 miscellaneous items, both of a taxonomic and biological nature, have appeared on this insect, and it seems desirable to bring them together at this time with such notes as the writer has accumulated. In view of its exceedingly narrow host range it is doubtful that it will ever become of economic importance. It is, however, commonly found in entomological collections, and, since it is often readily obtainable, it is used in teaching as an example of the suborder Tubulifera. Therefore, a discussion of its biology and the illustrations of its various stages and important anatomical characters (Plate I, figures 1-12) may be of some value.

This thrips is a member of the family Phlæothripidae. The genus *Neoheegeria*, established by Schmutz (1909), is not abundantly represented in North America and only a single species, *verbasci*, is known from California. Representatives of this genus are much more abundant in Europe and in the old world. Priesner probably has the largest collection of this group and informs the writer that he will shortly publish a review of the genus with a key to the species.

It is possible that additional species in this genus will appear from time to time in North America and a translation of Priesner's key to European species may be of some aid to other workers. The key, from *Thysanopteren Europas*, 1928, p. 629, follows:

Key to European Species of Neoheegeria

1. Head 1.2 to 1.3 as long as wide.....2
–. Head only 1.1 as long as wide, the third antennal segment with two sense cones.....*verbasci* (Osb.)
2. The third antennal segment with only two sense cones.....3
–. The third antennal segment with three sense cones. Body bristles long. Tube longer. Fore wings as a rule with 14-17 inter-located hairs.....*dalmatica* Schmutz
3. Fore wings with 10-12 inter-located hairs. Body stout, fore femora thick.....*lederi* Priesner

–. Fore wings with 6-7 inter-located hairs. Body less robust. Fore femora much more slender.....*johni* Priesner

NEOHEEGERIA VERBASCI (Osborn)

1888. *Phlæothrips* sp., Osborn.
1896. *Phlæothrips verbasci* Osborn.
1902. *Anthothrips verbasci,* Hinds.
1907. *Trichothrips femoralis* Moulton.
1912. *Haplothrips verbasci,* Karny.
1920. *Neoheegeria verbasci,* Priesner.
1928. *Neoheegeria verbasci,* Priesner.

A complete, technical redescription of this common thrips is not necessary (that of Hinds, 1902 and Priesner, 1928 are sufficient.) It will suffice to say that the adult is about 2 mm. in length. The body is shiny black to the unaided eye and the wings (fig. 12) folded on the dorsum form a silvery white Y. Segments 3 to 6 of the antennæ (fig. 11) yellow and the fore tibia yellow shading to brown at the base. Base of fore wing (including scale) brown; wings narrowed in middle and colorless.

The egg (fig. 2) is oval in shape, translucent white to pale yellow in color and about 0.377 mm. long without surface reticulations. The larva (figs. 1 and 3) is lemon to orange-yellow, often nearly a burnt-orange in color in mature individuals with the antennæ and tip of abdomen brown. The pupæ (figs. 4-6) are a pinkish-orange to salmon pink in color; the appendages are colorless. Both mature larva and pupa are about the same size as the adult.

For a full technical description of the immature stages see Priesner (1928), pp. 632-634.

HOSTS

The chief host plant of *N. verbasci* is mullein (*Verbascum thapsus* L.). In central Europe Priesner records five additional species of *Verbascum* as hosts—namely, *austriacum, lychnitis, nigrum, phlomoides,* and *phœniceum.* Other host records found in the literature from North America include corn, cherry, ceanothus, and black-eyed daisy. (On one occasion an adult found its way into the stomach of a trout.) These plants are doubtless transitional hosts, for reproduction takes place only on mullein. Attempts made by the writer to rear this thrips on other plants have failed. It can be seen that the host plant range is extremely narrow and perhaps entirely restricted to *Verbascum.* Hood (1917) states that it "feeds exclusively on mullein."

Distribution

This species is one of the most generally distributed of the phlæothripids. Priesner reports it generally over the whole of Central Europe up to 1400 meters (about 4600 feet) and specifically from Austria, Hungaria, Roumania, Balkan States, and England. Bagnall (1933) states: "In my experience the species becomes more common on the continent as one goes south-east and the genus has many representatives in south-eastern Europe and in India."

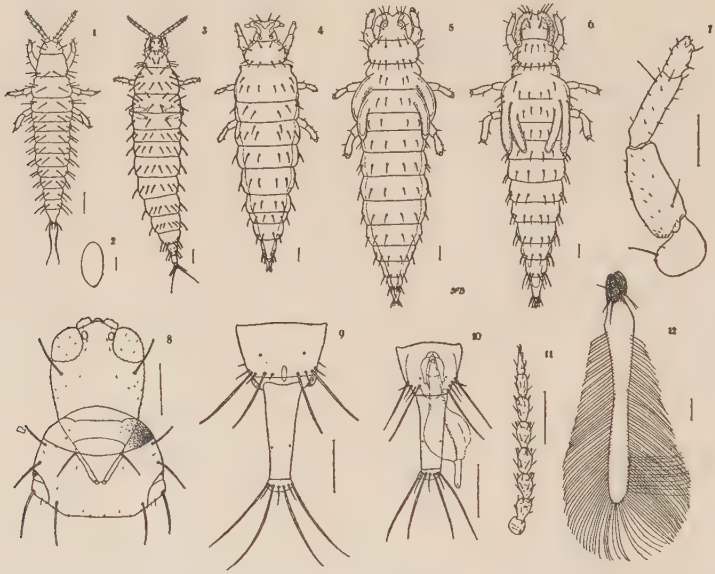
Aside from one record from Ontario, Canada, *N. verbasci* is known from the following states: California, Florida, Georgia, Indiana, Illinois, Iowa, Kansas, Maryland (and D. C.), Massachusetts, Michigan, Mississippi, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Utah, and Washington.

The presence of its host does not always mean the thrips is present, for the writer has collected on this plant in the eastern, central and western states and many times failed to find it. In California it is most commonly distributed in the Mother Lode district of the Sierra Nevada Mountains on the east side of the Sacramento Valley. From the Folsom district east to Emigrant Gap and at Donner Lake, Lake Tahoe, and Reno, Nevada, on the east side of the Sierra, it is very common. Tehama and Lassen counties are its limits to the north, the Sacramento Valley to the west, and Madera County on the south. Extensive collecting on mullein in Lake, Napa and Sonoma counties has failed to show its presence to the west of the Sacramento Valley. Collections from mullein in southern California also have been negative. In "Flowering Plants of California," Jepson states (page 896) that common mullein is found in "flats, valleys, mountain ridges or dry stream beds, nat. from Eur.: very common in the Sierra Nevada Pine belt; North coast Ranges." It is quite possible, then, that this thrips has been introduced from Europe and has not spread as rapidly as its host in North America.

Biology

The life cycle of the mullein thrips is spent entirely on the host plant. With the exception of the egg, all stages have been found throughout the year in central California during mild seasons at low elevations. At high elevations (about 3000 feet and up to 6000 feet) where the plants are partly or completely

winter-killed, the adults hibernate in the leaves at the base of the plant or in the flower spike which usually remains intact offering good protection. Early in March egg laying begins at low elevations and not until about the first of June at the highest points in its range. Since the host is usually a biennial, reproduction generally begins on the young plants which spring up around the older plants. A colony will remain on an individual plant for two years. The adults appear to migrate chiefly by crawling; they have been observed only rarely to fly. Copulation takes place on the plants in the usual manner.



Neoheegeria verbasci (Osb.): Figure 1, first instar larva; 2, egg; 3, mature larva; 4, prepupa; 5, first stage pupa; 6, second stage pupa; 7, fore leg of male; 8, head and prothorax of male; 9, tip of abdomen of female; 10, tip of abdomen of male, showing genitalia exserted; 11, antenna; 12, fore wing. Lines equal .1 mm.

The eggs are laid loosely among the forked hairs of the basal leaves and in among the flowers on the spike. In the laboratory, where the length of the stages was determined, the egg stage lasts 12 days. The larvæ feed together with the adults on the more tender growing portions of the host away from the direct sunlight. The larval stage extended on the average twenty-eight

days, but at higher summer temperatures is undoubtedly shorter. Pupation takes place among the feeding stages and consumes nine days.

There are two larval instars, a prepupal stage, and two pupal stadia or a total of five stages. Shull (1914, 1917) proved that this thrips could reproduce asexually, unfertilized eggs giving rise to males only.

After the first of June, at which time the first generation is complete, there is a continuous over-lapping, all stages being present well into October. At the lower elevations in California there appear to be three complete generations. The fuzzy nature of the leaf surface makes it difficult for natural enemies to reach the mullein thrips. However, *Triphleps tristicolor* White commonly preys upon *N. verbasci.*

These observations on the biology of the mullein thrips in California coincide with those of Osborn in Iowa and Priesner in Austria. These writers report hibernation taking place on the part of the adults in the seed pods and basal leaves. Osborn observed the eggs as being first laid in April and the first generation completed the last of June with a probable second. Priesner found larvæ and pupæ from May to late fall. The occurrence of individuals in other environments such as in drying corn husks and under willow bark (Priesner, 1928, p. 634) is undoubtedly a matter of chance.

While hundreds of adults and larvæ are often found on a single plant they apparently injure it very little. Osborn (1888) stated that the injury to the leaf showed "as yellow blotches, similar to those produced by *Tetranychus telarius.*" A slight browning around the base of the individual flowers in the spike and on the smaller leaves in the basal rosette is the only evidence of injury.

There are about 36 references to this thrips in the literature, many of which give host and distributional records; only the more important and those cited in this paper are listed below.

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Note on a Tabanid

In a recent paper by Mr. Allan Stone on the subfamily Tabaninæ of the Nearctic Region (U. S. Dept. of Agric., Misc. Publ. No. 304, p. 28, 1938) the author states that the co-types of *Tabanus dodgei* Whitney are now lost. This species was described from nine females received by Mr. Whitney from Mr. G. M. Dodge of Glencoe, Nebraska. The G. M. Dodge collection, at his death, was left to his brother, E. A. Dodge, later of Santa Cruz, California, and at the death of E. A. Dodge came to the California Academy of Sciences. This collection contains two females of *Tabanus dodgei* labelled Dodge County, Nebraska. They agree in every respect with Whitney's description. These are without doubt co-types that were returned by Mr. Whitney to G. M. Dodge. Glencoe is in Dodge County, but a few miles from the town of Dodge. As the Whitney material seems to have been lost, I have designated one of these specimens as the lectotype of *Tabanus dodgei* Whitney.—E. P. Van Duzee.

A KEY TO THE SPECIES OF NEBRIA OF NORTHWESTERN NORTH AMERICA

(Coleoptera, Carabidæ)

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In the accompanying key to the species of *Nebria* north of California and west of Colorado, I have followed in some of its essentials the classification of Bänninger, *Ent. Mitteil.*, XIV, 1925, pp. 187-195, 256-281. For additional literature see Horn, *Trans. Amer. Ent. Soc.*, III, 1870, pp. 97-104.—LeConte, *Bull. U. S. Geol. Geog. Surv.*, IV, 1878, pp. 473-480.—Schaupp, *Bull. Brook. Ent. Soc.*, 1878.—Van Dyke, *Pan-Pac. Ent.*, I, 1925, pp. 115-122; *Ann. Ent. Soc. Amer.*, XIX, 1926, pp. 8-12.—Bänninger, *Kol. Rund*, XIV, 1928, pp. 5-7; *Deutsch. Ent. Zeitschr.*, 1931, p. 178; 1933, p. 81.—Darlington, *Psyche* XXXVII, 1930, pp. 104-105; XXXVIII, 1931, p. 24.

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Key to Species

Tarsi above glabrous; labial palpi with penultimate segment with three setæ.

1 (40) Elytral humeri rounded, evident; male protarsi with three segments dilated; head behind eyes not or scarcely impressed .....subg. *Neonebria* Hatch (*Nebria* Ganglb. nec Latr.)

2 (27) Pronotum with a seta-bearing puncture at side just in front of middle; legs black.

3 (18) Abdominal sternites three to five with from two to five seta-bearing punctures on each side of the middle along the posterior margin.

4 (7) Elytra shining black; pronotum with side margins widely reflexed, curving out directly from the hind angles.

5 (6) Only the third elytral interval with from three to five dorsal punctures, the interval not catenate; elytral humeri prominent, strongly rounded, the base of the elytra wider than the pronotum at its widest; hind angles of pronotum rectangular; head between eyes without rufous spots; length 12-13 mm.; Yukon (4), Alberta, Saskatchewan (7), eastern Washington, Idaho, western Montana, Colorado, New Mexico (5) .....*hudsonica* LeC.

6 (5) Elytral intervals three, five, and seven catenate, with

from four to six dorsal punctures; the elytral humeri less prominent, more broadly rounded, the base of the elytra narrower than the pronotum at its widest; hind angles of pronotum acute; head between eyes with a pair of rufous spots; length 15-16 mm.; Washington (Mt. Rainier, Olympic Mts. (15), Mt. Adams—Lane), Oregon (Mt. Hood); (*trifaria* Van Dyke *pars*[1]) ..... *vandykei* Bänninger

7 (4) Elytra more or less brilliantly metallic, the third and seventh and frequently the fifth interval catenate with from one to eight dorsal punctures; head between the eyes with a pair of rufous spots.

8 (17) Elytral humeri prominent, strongly rounded, the base of the elytra wider than the pronotum at its widest; side margins of pronotum widely reflexed.

9 (10) Fifth elytral interval usually without punctures; length 10-12 mm., usually under 12; color brilliant metallic; elytral intervals rounded to flat; hind angles of pronotum acute to rectangular or subobtuse; southeastern Alaska (15) and Alberta through western Montana and northern Idaho to northern Oregon [Mt. Hood (15), Wallowa Mts.] ..... *gebleri* Dej.[2]

10 (9) Fifth elytral interval always with dorsal punctures; length 10-14 mm., usually over 12 mm.; elytral intervals more or less convex.

11 (12) Hind angles of pronotum strongly acute, the side margins in front of the hind angles evidently parallel; elytra less brilliantly metallic; length 10-13 mm., usually over 12 mm.; Washington (Glacier Peak, Mt. Rainier, Olympic Mts.) ..... *meanyi* Van D.

12 (11) Hind angles of pronotum rectangular or obtuse, the side margins curving out almost directly from the hind angles; elytra more brilliantly metallic.

13 (14) Elytra reddish purple, the striæ usually finely, obscurely punctate; hind angles of pronotum subrectangular; length 11-14.5 mm.; Aleutian Is. (13) along the coast to northern Washington (Mt. Rainier, Olympic Mts.); eastern British Columbia (2); western Montana (13) ..... *metallica* Fisch.

14 (13) Elytra violaceous.

15 (16) Elytral striæ finely, obscurely punctate; hind angles of pronotum rectangular; dorsal punctures more strongly im-

[1] *Vandykei* is said to be distinguished from typical *trifaria* LeC. (Colorado, Utah) by its more shining dorsal surface due to a finer microsculpture, relatively broader head; the pronotum with more prominent anterior angles, more feebly arcuate sides, the side margins in front of the hind angles very feebly sinuate, the side margins more strongly reflexed, the hind angles more prominent and more acute; the elytra broader, more evidently inflated behind, the intervals more convex; the aedeagus nearly evenly arcuately narrowed along its outer margin, the end broadly rounded.

[2] Specimens of *gebleri* in my collection from the eastern portions of its range, especially a series from the Wallowa Mountains, Oregon, seem to have the elytral intervals flatter, the hind angles of the pronotum less acute, and the side margins of the pronotum in front of the hind angles less parallel than do coast specimens, and may represent a feebly differentiated subspecies.

pressed, from six to eight in a series; length 14 mm.; Alberta (Banff) ..... *schwarzi* Van D.

16 (15) Elytral striæ relatively coarsely punctate; hind angles of pronotum obtuse; dorsal punctures less strongly impressed, from five to seven in a series; length 13-14 mm.; replaces *metallica* at high elevations in the western portions of British Columbia (Merritt) (3) and Washington (Darrington, Glacier Peak, Mt. Baker, Mt. Rainier, Olympic Mts., Skagit River, Mt. Adams—Lane) ..... *piperi* Van D.

17 (8) Elytral humeri less prominent, more broadly rounded, the base of the elytra narrower than the pronotum at its widest; elytral intervals three, seven, and sometimes five catenate, with dorsal punctures; side margins of pronotum narrow, very narrowly reflexed, the hind angles subobtuse; elytra purple; length 11.5-12.5 mm.; western Montana (11), Idaho (15), Colorado ..... *purpurata* LeC.

18 (3) Abdominal sternites three to five with only a single seta-bearing puncture on each side of the middle along the posterior margin; head between eyes without a pair of rufous spots; sides of pronotum widely reflexed.

19 (26) Dorsal punctures strongly impressed.

20 (23) Pronotum from three-fifths to two-thirds as long as broad, its sides in front of the hind angles usually appreciably subparallel; color more or less brownish; dorsal punctures confined to third interval.

21 (22) Length 9-10 mm.; usually smaller and less robust; Labrador (14), Alberta, Montana, British Columbia, eastern Washington ..... *labradorica* Csy.

22 (21) Length 9-11 mm.; usually larger and more robust; Washington [Cascade Mts. (14), Glacier Peak (14), Mt. Bonaparte, Mt. Rainier, Olympic Mts. (14)] ..... *crassicornis* Van D.

23 (20) Pronotum less than three-fifths as long as broad, its sides in front of the hind angles very briefly constricted, curving out almost at once from the hind angles.

24 (25) Color black or brownish; elytra with fifth interval usually with impressed dorsal punctures, the intervals variably convex, the striæ variably punctate; the hind angles of the pronotum subrectangular to obtuse, the side margins in front of the hind angles strongly sinuate to nearly oblique; legs black to rufous; length 8.5-10 mm.; Kamchatka (13) and eastern Siberia (13) through central and south central Alaska (13) to Mackenzie (13) ..... *bifaria* Mann.

25 (24) Color above metallic bronze or green to (*parvula* Sahlb., *reducta* Csy.) very black; fifth elytral interval without dorsal punctures; hind angles of pronotum nearly rectangular; length 7.5 mm.; Pribilof Is.(?) (13), southwestern (13) and central (4) Alaska, Yukon (4) ..... *viridis* Horn[3]

[3] Schaupp (Bull. Brook. Ent. Soc. 1878) includes "Wash. Terr." among the localities cited, but there is no recent confirmation of the occurrence of this species in this region.

26 (19) Dorsal punctures not or very feebly impressed; color black, the elytra obscurely viridescent; pronotum with hind angles obtuse, the side margins in front of the hind angles oblique, scarcely sinuate; length 9-12 mm.; British Columbia (8) and northern Idaho to northern California (8); (*brevis* Csy.) ..... *virescens* Horn

27 (2) Pronotum without a seta-bearing puncture at sides; abdominal sternites three to five with two to four seta-bearing punctures on each side of the middle along the posterior margin; dorsal punctures confined to the third elytral interval; head between eyes usually with a pair of rufous spots (sometimes absent in *sahlbergi*).

28 (39) Hind angles of pronotum subrectangular.

29 (34) Pronotum with side margins for a considerable distance in front of the hind angles subparallel or even incurved, side margins broadly reflexed.

30 (31) Pronotum with hind angles rectangular or slightly acute, the side margins in front of the hind angles subparallel or very feebly incurved; elytra black, frequently with a violaceous or viridescent tinge; legs usually black but specimens with pale legs are cited; length 8.5-9.5 mm.; south central Alaska (13) to Oregon, Colorado (13), Lake Superior (12), Labrador (12), Newfoundland (12), and New Hampshire (12)..*sahlbergi* Fisch.[4]

31 (30) Pronotum with hind angles acute, the sides of the pronotum in front of the hind angles somewhat recurved.

32 (33) Larger (length 10-11.5 mm.); the elytra frequently metallic green or blue; legs variable in color; seacoast of southern Alaska from Unalaska to Sitka (13).....*gregaria* Fisch.[5]

33 (32) Smaller (length male: 9 mm., female: 11 mm.); elytra nigropiceous, the antennæ and legs paler; distinguished, according to Van Dyke, from *gregaria* by being less elongate, the pronotum with the sides more suddenly constricted posteriorly and the basal impressions better defined, the elytra with better defined humeri, sides more parallel and general shape less spatulate, and from *sahlbergi* by its shorter elytra and less evidently punctured striæ; southern Alaska (Unalaska, Katmai, Kodiak) (13).....*aleuta* Van D.[5]

34 (29) Pronotum with side margins curving out almost immediately from the hind angles, the side margins relatively narrow and feebly reflexed.

35 (38) Dorsal surface black.

36 (37) Legs black; length 10.5-13 mm.; southeastern Alaska (15) west of the Cascades to Oregon (15)..*mannerheimi* Fisch.[6]

[4] Compare remarks on this species by Van Dyke (12) and Fall (4). The eastern phase is *moesta* LeC., but Miss Mank (11) believed that she detected both *moesta* and *sahlbergi* in her material from Glacier National Park.

[5] Both *gregaria* and *aleuta* are closely similar to *sahlbergi*, of which they may be local races.

[6] *Mannerheimi* is recorded from Colorado by Wickham (16) but the record requires confirmation.

37 (36) Legs pale; length 10-12 mm.; Alaska (9) through eastern and western Washington and Oregon to southern California (15); (*tenuipes, transversa, hippisleyi,* and *formalis* of Casey) ..... *eschscholtzi* Men.

38 (35) Dorsal surface and legs pale; length 9.5-11 mm.; sea beaches from British Columbia (15) to Crescent City, California (15) ..... *diversa* LeC.

39 (28) Hind angles of pronotum obtuse, the side margin in front of the angles oblique, not or scarcely sinuate, side margins widely reflexed; black, the legs and antennæ pale; length 11-12 mm.; eastern Washington and Alberta through western Montana (6) to Wyoming (9), Colorado (16), and Utah (10) ..... *obtusa* LeC.

40 (1) Elytral humeri oblique ..... subg. *Nebriola* Daniel
Elytra bright metallic, the third and seventh intervals with dorsal punctures; pronotum with a seta-bearing puncture at sides just in front of middle, the hind angles rectangular or acute; head with a pair of rufous spots between eyes; legs black; male protarsi with three segments dilated.

41 (42) Head and pronotum obscurely metallic; sides of pronotum in front of the hind angles distinctly parallel for a considerable distance, abdominal sternites three to five usually with a single seta-bearing puncture on either side of middle along the posterior margin; length 12-13 mm.; southeastern Alaska (15), British Columbia (1), Washington [Glacier Peak (15), Mt. Rainier, Olympic Mts.], Oregon (Mt. Hood); (*columbiana* Csy.) ..... *kincaidi* Schwarz

42 (41) Head and pronotum not metallic; sides of pronotum curving out almost directly from the hind angles; abdominal sternites three to five usually with two seta-bearing punctures on either side of middle along the posterior margin; length 12-13.5 mm.; British Columbia [Selkirk Mts. (15), Lyman Glacier], Washington (Mt. Adams, Mt. Rainier, Olympic Mts.), Oregon (Mt. Hood); (*kincaidi* Bänn., *columbiana* Van Dyke, *vandykei* Darl.) ..... *paradisi* Darl.

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COLLECTING AND DISTRIBUTIONAL NOTES ON SOME CALIFORNIA WEEVILS

(Coleoptera, Curculionidæ)

Rhynchites velatus Lec., which heretofore has been exceedingly rare in collections, was taken in great numbers on *Prunus andersonii* Gray, "Desert Peach," (host identified by Willis H. Wheeler) at Coleville, Mono County, California, on May 27, 1939, by M. A. Cazier, T. H. G. Aitken, Anthony Downes, and the writer. Additional specimens were collected by Stewart Lockwood and A. Showler on the same host at Peavine, Sierra County, California, on June 9, 1939. This striking species was described in 1880 by LeConte merely from Sierra Nevada, California. To the best of the writer's knowledge the species remained unknown except for the type specimen for over thirty years until R. S. Woglum collected a few larvæ and adults at Palm Springs, Riverside County, California, on May 15, 1914, in the fruit of *Prunus fremontii* Wats. (*Prunus eriogyna* Mason), "Desert Apricot." Later, on April 25 and April 4, 1915 and 1925, Dr. E. C. Van Dyke collected four more specimens at Palm Springs, California. Since one of the hosts, *Prunus andersonii* is known to occur as far north as Modoc County, California, *Rhynchites velatus* probably occurs along the western margin of the Great Basin for nearly a thousand miles.

Crocidema californica Van Dyke, type locality Idyllwild, Riverside County, California, was collected at Coleville, Mono County, California, by Mr. W. E. Simonds on July 9, 1933, and again at the same locality on May 27, 1939, by M. A. Cazier, T. H. G. Aitken, Anthony Downes, and the writer. This species, or a variety of the same, was also collected at Cedarville, Modoc County, California, on May 29, 1939, by the four latter collectors. The preferred host at the Coleville and Cedarville localities appeared to be *Purshia tridentata* DC.—P. C. Ting.

NOTES ON THE TAXONOMY OF NOCTUID LARVÆ
(Lepidoptera)

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The difficulties involved in the taxonomy of lepidopterous larvæ are well known. The work of Forbes, Dyar, Smith and others has led to the useful identification of the supra-generic categories in the order and has clarified many phylogenetic relations that could not have been understood from a study of the adults alone. But so similar are the great number of caterpillars that in only a few families have adequate generic and specific characters been found. In one of the largest and most economically important families, the Noctuidæ, the taxonomy of the larvæ has proceeded so slowly that relatively few of the 4000 or more species of North American noctuid larvæ can be positively identified. One may often compare the larvæ of two distinct species, segment by segment and part by part, without finding an applicable diagnostic character.

The purpose of this paper is to briefly illustrate some structural variations which are of taxonomic value in the study of noctuid larvæ by use of two closely related species in the genus *Heliothis*. The writer has recently been engaged in extending the work of Lange and Michelbacher (1) in the separation of *Heliothis obsoleta* (Fabr.) from *H. phloxiphaga* G. and R. in the larval, pupal and adult stages. The moths often occur together in the tomato fields of central California, although only the corn earworm can pass its life cycle on tomato. In these areas *H. phloxiphaga* larvæ feed chiefly on *Hemizonia congesta* (tarweed) and *Grindelia robusta*. The adults are easily separated, the pupæ less so, but the larvæ are sometimes almost indistinguishable.

Color and size are the most obvious characters, but they must be employed with caution. The color pattern of some noctuid larvæ varies greatly, depending on the stage of larval development, the host plant or plant part attacked and perhaps the temperature and season. The size attained by full grown caterpillars may depend on the nature and abundance of food.

H. obsoleta ranges in color from green, pink or brown to slate gray with white bands. It has been observed in this lab-

oratory that on corn the larvæ tend to be yellow and pale brown, on alfalfa dark green, on lettuce pale brown and on tomatoes brown with red and green hues. *H. phloxiphaga* varies from slate gray with prominent white stripes on tarweed to dark green on *Grindelia*. In the laboratory these caterpillars may be successfully reared on lettuce and tend to be dark green in color. Other noctuid larvæ, such as *Autographa californica* (Speyer), show less range in color pattern.

Sixth instar larvæ of *obsoleta* are larger than those of *phloxiphaga* in the corresponding stage. In young larvæ, however, there is no difference in size. The stage of larval development and the environmental conditions should be taken into consideration in using color and size as specific characters.

The pigment pattern of the cuticle is not destroyed by ordinary reagents. It is composed of a more or less definite arrangement of small oval or round areas. In *phloxiphaga* these maculations are more numerous in the dark sub-dorsal bands than they are in the same areas of the corn earworm. In early stages these differences do not obtain. The microscopic structure of the cuticle offers generic characters. In *Heliothis* the skin is thickly beset with minute, sharply conical spinules. It is quite likely that in some genera the structure of the cuticle may be of specific value.

The size of the primary setæ and setigerous tubercles is of value. Typically, *phloxiphaga* is spinose with dark sub-conical tubercles, while *obsoleta* is rather smooth and has smaller, paler tubercles. But those factors influencing color may often cause changes in the appearance of the setæ. Dark larvæ tend to appear more spinose than pale individuals.

The arrangement of the primary setæ of noctuid larvæ is so uniform that they offer no satisfactory taxonomic characters. The form and number of the crochets on the abdominal legs and the shape or size of the spiracles are as yet of minor systematic importance. In the two species of *Heliothis* referred to, the shape and size of the tarsal claws are similar, but this structure can often be used for the separation of genera in the family. The shape and size of a sclerotized area is of fundamental importance in a study of this kind and no such region should be neglected.

It is probably in the larval head that the most valuable diagnostic characters can be located. It will be desirable first to

enumerate a few structures which are similar in *obsoleta* and *phloxiphaga*, but have been used to separate other noctuid species. (1) the arrangement of ocelli, (2) the size and shape of the adfrontals and clypeus, (3) the length of the epicranial stem (the dorso-median suture of the head), (4) the mandibular dentes and basal processes, (5) the shape and relative size of the sclerotized areas of the antennæ and labium and (7) the palpi and their setæ.

The cuticular coloration of the head frequently offers specific characters. In many species the vertex is darker than the rest of the head. *H. phloxiphaga* may conveniently be distinguished from the corn earworm by the reticulate, fuscous, sub-median arcs of the head.

The internal, or posterior, face of the labrum presents several characters of value—the epicranial setæ, the epicranial shield (the thickened area on the ventral margin) and the labral notch. In *obsoleta* the epicranial shield is somewhat larger and the notch relatively shallower than in *phloxiphaga*. The epicranial setæ are similar in the two species, although slightly larger in full grown corn earworms.

Ripley (2) has shown that the labro-hypopharyngeal complex which forms the spinneret and its supporting structures in lepidopterous larvæ is of great value in taxonomic work, although the homologies of this area are not clearly understood. The spinneret is located on the mesal portion of the membrane between the palpigers. The proximal sclerite of the spinneret varies in shape and secondary chitinization within the family. In the Noctuidæ the palpigers form an incomplete ring, ending dorsally at the labial palpi. The sensorium on either side of the median ventral line is partially surrounded by a chitinized extension of the palpiger, differing in shape within the family. In *Heliothis* the hypopharynx is covered with numerous, short, stout setæ which are longer at the lateral margins.

The two species of *Heliothis* studied are so closely related that, of the above characters, only the palpigers are of specific value and even then, just in mature larvæ. In *obsoleta* the palpigers are narrower and the dorso-cephalic angle is more produced than in *phloxiphaga*. In addition, the proximal sclerite of the labial palpi is usually larger in the former species.

The taxonomic value of the spinneret and its allied structures

has perhaps not yet been realized. These structures are of particular significance in those cases in which the more obvious characters are not conclusive. A systematic arrangement of noctuid larvæ can only result from a more detailed morphological examination of all larval structures. Such progress should be of special importance to lepidopterists and agricultural entomologists.

The writer wishes to acknowledge the assistance and cooperation extended by Dr. A. E. Michelbacher.

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NOTES ON NORTH AMERICAN SPECIES OF MEGARHYSSA

(Hymenoptera, Ichneumonidæ)

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The genus *Megarhyssa* Ashmead has recently been placed by Roman (1933:38) in synonymy with *Pimpla* Fabricius on the basis of a supposed type designation by Fabricius. However, as pointed out by Richards (1937:117), Fabricius did not designate genotypes in the sense of the present code of nomenclature; he merely described one species in most of his genera more fully than any of the others. For this reason, it seems that *Megarhyssa* should not be considered a synonym of *Pimpla*.

Although several authors have given keys to our four species of *Megarhyssa*, identification of certain specimens has remained difficult because of the great color variation in some species. In the keys here given, therefore, an attempt has been made to use structural characteristics in separating the species.

Key to the North American Species of Megarhyssa

FEMALES

1. Middle of posterior margin of heavily sclerotized portion of first sternite distinctly behind a vertical line through posterior end of first abdominal spiracle; ovipositor about one and one-half times as long as body; length of sclerotized part of

seventh tergite on middorsal line nearly equal to length of sixth tergite middorsally.....*greenei* Viereck

–. Middle of posterior margin of heavily sclerotized portion of first sternite anterior to a vertical line through posterior end of first abdominal spiracle; ovipositor nearly twice to nearly three times as long as body; length of sclerotized part of seventh tergite on middorsal line less than one-half length of sixth tergite middorsally.....2

2. Malar space nearly as long as basal width of mandibles; face black with broad yellow lateral marks; tergites three to five with conspicuous, yellow, round, lateral spots; posterior lateral angles of abdominal tergites three to five but little produced, about right angular, although rounded.....*nortoni* (Cresson)

–. Malar space shorter than basal width of mandibles; face largely yellow, or at least with some yellowish medially; tergites three to five without round yellow spots on sides.....3

3. Posterior lateral angles of abdominal tergites three to five but little produced, obtuse, rounded; body almost entirely black; ovipositor nearly three times as long as body.....*atrata* (Fabricius)

–. Posterior lateral angles of abdominal tergites three to five produced, right angular or acute, although narrowly rounded; body brown or blackish, often with extensive yellow markings; ovipositor about twice as long as body.....*lunator* (Fabricius)

MALES

1. Middle of posterior margin of heavily sclerotized portion of first sternite behind a vertical line through posterior end of first abdominal spiracle by distance equal to that from anterior end of first abdominal spiracle to anterior end of first tergite.....*greenei* Viereck

–. Middle of posterior margin of heavily sclerotized portion of first sternite on or only slightly posterior to a vertical line through posterior end of first abdominal spiracle.....2

2. Malar space longer than apical width of mandibles; face black with broad, yellow, lateral marks; posterior lateral angles of tergites three to six produced and acute, although narrowly rounded.....*nortoni* (Cresson)

–. Malar space as long as apical width of mandibles; face largely yellow, or at least with some yellowish medially.....3

3. Posterior lateral angles of abdominal tergites three to six but little produced, right angular or slightly acute, although rounded .....*atrata* (Fabricius)

–. Posterior lateral angles of abdominal tergites three to six produced, very acute.....*lunator* (Fabricius)

MEGARHYSSA GREENEI Viereck

Although Rohwer (1920:426) agrees with Viereck in stating that the female of this species has a cloud below the stigma, specimens of both sexes from Ithaca, New York, June 25, 1917, collected by Dr. E. C. Van Dyke have clear wings. Dr. G. Stuart Walley writes that a majority of the specimens in the Canadian National collection have immaculate wings, although a few females have a spot behind the stigma.

MEGARHYSSA NORTONI (Cresson)

This is the only known species in the far west, where it is quite common; but it is also found in the east, although apparently rarely. Dr. Walley sends records of specimens from as far east as Grand River, Nova Scotia, and points out that in eastern specimens the abdomen is more brownish than in western ones, and the mesocutum usually brownish instead of black as in western individuals.

NEW YORK: Buffalo, October, 1900 (E. P. Van Duzee). UTAH: Aspen Grove, Mt. Timpanogos, July 6, 1935 (E. C. Van Dyke); Park City, July 3, 1922 (E. P. Van Duzee). BRITISH COLUMBIA: Nanaimo Biological Station, June 26, 1920 (E. C. Van Dyke); Trinity Valley, Lumby, September 2, 1937 (K. Graham). WASHINGTON: Steven Pass, Cascade Mountains, July 14, 1930 (E. C. Van Dyke). OREGON: Fremont National Forest, Klamath County, June 18, 1922 (E. C. Van Dyke). CALIFORNIA: Shasta Springs, June 5, 1920 (C. L. Fox); Mt. Shasta, July 30 (Graham Held); Meadow Valley, Plumas County, 4000 to 5000 feet, June 1 to 7, 1924 (E. C. Van Dyke); Cisco, June, 1910 (G. Von Geldern); Zenia, June 19, 1935 (H. J. Rayner); Fallen Leaf Lake, Lake Tahoe, July 9, 1915 (E. C. Van Dyke); Echo Lake, July 23, 1933 (E. C. Zimmerman); Yosemite Valley, July 8, 1921 (E. C. Van Dyke); San Mateo County, June 20, 1936 (G. E. Bohart); Carmel, June 10, 1908 (F. X. Williams); Huntington Lake, Fresno County, 7000 feet, July 4 (E. P. Van Duzee); Rock Creek Lakes, Inyo County, 9700 feet, July 19 to 21, 1934 (G. E. Bohart); Giant Forest, Tulare County, July 24, 1922 (C. L. Fox). The specimens recorded above are in the collection of the California Academy of Sciences.

MEGARHYSSA LUNATOR (Fabricius)

This is a widely distributed and highly variable species. Although specimens from any one locality exhibit a rather broad range of variation in size and coloration, a study of individuals from the entire distribution of the species shows that there are several well defined geographic forms, as described below.

MEGARHYSSA LUNATOR LUNATOR (Fabricius)

Ground color usually rather light brown; antennæ brown basally, yellower apically; face yellow with brown markings; wings clear, almost always with dusky area behind apex of stigma; stigma darker apically than basally; first tergite of female with apical yellow fascia; tergites three to seven of female each with a narrow V-shaped or curved yellow line on each side; first and second tergites of male each with small, apical, yellow fascia.

This form is found from the Atlantic coast to the eastern side of the Rocky Mountains, although apparently replaced by *phaeoptila* in parts of the southern states.

The dark area on the fore wings is frequently reduced in size in the males, and in one specimen from Ithaca, New York, collected by E. C. Van Dyke it is entirely missing. Also a female from Schuyler County, New York, August 28, 1878 (A. J. Burner) lent from the National Museum collection through Mr. R. A. Cushman has the dark areas of the wings inconspicuous and pale yellowish. Possibly it is a teneral or in some way bleached specimen.

Megarhyssa lunator phaeoptila Michener, new subspecies

Female: Ground color of body dark brown; antennæ yellowish brown; face largely brown; wings dark brown, with a clearer area behind base of stigma; stigma darker apically than elsewhere; first tergite with small yellow apical fascia; tergites three to seven each with a very narrow V-shaped or curved subapical yellow line on each side, these lines broken on sixth tergite.

Holotype (U. S. N. M. Type number 53193): Victoria, Texas, October 15, 1910, on oak tree in river bottom (J. D. Mitchell). Paratype: New Orleans, Louisiana (F. O. Minor). These specimens were lent to me by Mr. Cushman from the National Museum collection, to which they will be returned.

This is evidently a southern form of *lunator*, from which it may most easily be distinguished by its almost entirely dark

brown wings (the wings are clear with a dark spot in typical *lunator*). Also the yellow lines on the sides of abdominal tergites three to seven of the female are narrower in *phaeoptila* than in *lunator*.

Two additional female specimens from Austin, Texas, October, 1900 (A. L. Melander collection), kindly lent me by Mr. R. D. Shenefelt of Washington State College, have the wings a little clearer basally and subapically than in typical *phaeoptila*, the ground color of the body not as dark brown as in the types, and the lateral yellow lines of the abdomen broader, as in typical *lunator*. Thus it is evident that *phaeoptila* intergrades with *lunator*.

Megarhyssa lunator icterosticta Michener, new subspecies

Ground color of body light brown; antennæ yellowish; face almost entirely yellow; wings light golden brown, with clearer area behind base of stigma in female, slightly darker area behind apex of stigma in male; stigma evenly brown throughout; first abdominal tergite of female without apical yellow fascia; tergites three to seven of female with broad yellow lateral areas, those of third tergite broad crescentic marks with lower arms longer than upper; fourth and fifth tergites yellow except for the margins and a middorsal band, narrowed posteriorly; sixth tergite yellow except for margins, seventh yellow except for posterior margin and area around spiracles; tergites one and two of male without apical yellow fasciæ.

Holotype, female, No. 4761, Calif. Acad. Sci., Ent., allotype, male, No. 4762, Calif. Acad. Sci., Ent., and thirteen paratypes from Durango, Colorado, collected on July 9, 1933, by my friend, Mr. K. L. Maehler. Females were ovipositing in a log. Additional specimens are from Ft. Douglas, Utah, June 15, 1933 (O. H. Swezey, Calif. Acad. Sci.), Salt Lake City, Utah, June 8, 1938 (Bill Higley); Beaver Canyon, Utah, August (U. S. N. M.); Oak Creek Canyon, Utah, July 12, 1930 (L. F. Clarke) and June 14, 1937 (L. R. Jeppson); Roosevelt, July 17, 1938 (G. F. Knowlton, F. C. Harmston); Grantsville, Utah, July 5, 1938 (L. L. Hansen); Tooele, June 21, 1930 (G. F. Knowlton, M. J. Janes); and Las Vegas, New Mexico (F. Springer, U. S. N. M.). Although these specimens are darker than most of the Durango specimens, especially in ground color, and some females have the yellow marks of the sides of the fourth tergite reduced to broad cres-

cents like those of the third tergite, none approach the coloration of typical *lunator*. Nearly all specimens have the yellow markings of the thorax more extensive than in *lunator*. Paratypes will be placed in the collections of the United States National Museum, Colorado State College, University of Kansas, K. L. Maehler, and the author.

This is a very distinct subspecies of *lunator*, if it is not a distinct species. It occurs in the eastern part of the Great Basin region, on the western slope of the Rocky Mountains, and east into central New Mexico at least as far as Las Vegas. It is most noticeably separated from *lunator* by the light brown wings and the extensive yellow areas on the sides of the abdomen of the female. The absence of yellow apical fasciæ on the first two abdominal tergites of the male and the first tergite of the female in this otherwise strongly maculated form may lend weight to the idea that this is a distinct species.

MEGARHYSSA LUNATOR subspecies(?)

Under this heading I treat a single female specimen sent by Mr. Cushman from the National Museum collection. It is from College Farm, Mesilla Valley, New Mexico, April, 1898, collected by C. E. Mead, and from the T. D. A. Cockerell collection. It is similar to *icterosticta*, although its wings are slightly paler than in that subspecies, but the propodeum and first two abdominal tergites are almost entirely yellow, and its yellow markings otherwise are unusually extensive. Furthermore, the lateral angles of tergites three to five are unusually blunt for *lunator*, although there is some variation in this character in other subspecies. A male which is exceptionally pale for *icterosticta* and may belong to this form is from the Baboquivari Mountains, Arizona, September, 1924 (O. C. Poling, Calif. Acad. Sci.).

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EAST ASIAN HISPINÆ AND CASSIDINÆ IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

(Coleoptera, Chrysomelidæ)

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This paper is in the nature of a brief report on the hispine beetles and tortoise beetles from eastern Asia in the collection of the California Academy of Sciences in San Francisco. Most of the material is from eastern China, Indo-China, the Philippine Islands and Borneo, while the remainder is from Manchuria, central and southern Japan, Formosa, western China, Hong Kong, the East Indies and Ceylon. Many of the specimens were collected in 1923 by Dr. E. C. Van Dyke, some were taken by Mrs. Dora E. Wright, and the remaining specimens were largely collected by Dr. J. C. Thompson and Albert Koebele. In all, sixty-nine species are enumerated, of which three are described as new to science. Two of the latter are from Borneo and one is from China, all three belonging to the Hispinæ. I am greatly indebted to Mr. E. P. Van Duzee of the California Academy of Sciences and to Dr. E. C. Van Dyke of the University of California for the privilege of studying this material, and to Dr. S. Maulik of the British Museum for comparing certain specimens with types.

SUBFAMILY HISPINÆ

Tribe Anisoderini

1. Lasiochila balli Uhmann, 1930

A singe topotype from Kanshirei, S. W. Formosa was collected on March 25, 1909, by Dr. J. C. Thompson.

2. Lasiochila feæ (Baly), 1888, new combination

One specimen was taken at Riv de Quangtri, Annam, Indo-China, on April 25, 1925, by Mrs. Dora E. Wright. New to Indo-China.

Tribe Callispini

3. Callispa apicalis Pic, 1924

A specimen was collected at Hangchow, Chekiang Province, E. China, May 19, 1923, by Dr. E. C. Van Dyke.

4. Callispa bowringii Baly, 1858

A topotype is in the collection, taken on Hong Kong Island, March 1, 1925.

5. Callispi cumingii Baly, 1858

One example was taken on Mt. Pina Tuba, Philippine Island, 5,600 ft. alt., April, 1907, by J. C. Thompson.

6. Callispa flavescens Weise, 1911

One specimen was collected at Alabang, Luzon, Philippine Is., June 11, 1930.

7. Callispa fortunii Baly, 1858

Several were taken at Hangchow, Chekiang, E. China, May 23, 1923, by Dr. Van Dyke.

Tribe Leptispini

8. Leptispa godwini Baly, 1869

A few examples were taken at Hangchow, Chekiang, May 19, 1923, by Dr. Van Dyke.

Tribe Oncocephalini

9. Oncocephala bicristata Chapuis, 1876

Seven specimens were collected at Subig Bay, Luzon, May 1907, J. C. Thompson; one was taken at Dolores, Luzon, May 17, 1930.

10. Oncocephala quadrilobata Guerin, 1844 ?

One specimen was taken at Hue, Annam, Indo-China, May 15, 1927, by Mrs. Dora E. Wright.

Tribe Promecothecini

11. Promecotheca cumingi Baly, 1858

A specimen was taken at Manila, Philippine Is., March 1926.

Tribe Gonophorini

12. **Downesia vandykei** Gressitt, new species

Small, very narrow, broadest posteriorly; shiny; reddish brown, posterior four-fifths of elytra pitchy, neck pitchy red above and below, pitchy black at sides, occiput dull reddish brown, pitchy

at sides, antennæ pitchy brown to pitchy black, first two segments reddish brown, eyes blackish with golden-brown markings, first two abdominal segments yellowish brown, remainder reddish brown.

Head rounded anteriorly, nearly as wide as basal margin of prothorax; frons swollen, transverse, punctured, its posterior margin convex; vertex depressed, non-tuberculate; occiput nearly plane, feebly concave behind, finely and sparsly punctured; eyes large, about one-third deeper than wide, strongly convex interiorly; neck shiny, nearly impunctate. Antennæ one-third as long as body, thickened apically, clothed with minute golden-brown hairs, scape nearly glabrous, swollen, barely longer than second segment, which is cylindrical; third nearly as long as second, a little longer than fourth; fourth to sixth subequal; seventh to tenth a little longer, subequal; last longest. Prothorax slightly longer than broad, widened toward apex; sides nearly straight; apical margin convex, basal margin feebly so; surface convex, minutely and irregularly punctulate; base transversely grooved; lateral margins slightly expanded. Scutellum small, slightly concave. Elytra widened toward apex, broadly rounded behind, longitudinally punctured in seven rows anteriorly and in eight rows posteriorly, first row branching a little before middle, three raised lines between pairs of punctures, first broad and depressed on basal half, all distinctly raised apically. Metasternum punctured only along lateral margins; abdomen finely punctulate on apical segments. Length 4.4 mm.; breadth 1.2 mm.

Holotype, No. 4696, Calif. Acad. Sci., Ent., Hangchow, Chekiang Province, East China, May 19, 1923, collected by Dr. E. C. Van Dyke. Named in honor of the collector as a slight token of gratitude for kindness and aid extended by him to the writer.

This species differs from *D. marginicollis* Weise in being about one-half as large, mostly red instead of black, with the elytra red on basal fifth, etc. Differs from *D. tarsata* Baly in having the elytra largely black instead of yellowish, the tarsi brownish instead of black, etc.

13. Agonia purpurascens Gressitt, new species

Moderately elongate, nearly parallel. Body metallic reddish purple to purplish brown: head brownish purple; antennæ black with silvery pubescence on apical two-fifths; pronotum bronzy or brownish purple; scutellum blackish; elytra shiny reddish purple; ventral surfaces reddish brown with bronzy or purplish tinges; legs pitchy, greenish and bronzy in part. Dorsal surfaces of body glabrous; borders of abdomen narrowly with short pale oblique hairs.

Head barely as broad as anterior margin of prothorax, smooth, impunctate except on labrum. Antennæ a little more than one-half as long as body, moderately slender; scape about as long as, though thicker than, second segment; third about as long as eleventh, a little shorter than combined length of first two segments; sixth longer than fifth and shorter than fourth; last thickest, subacute apically. Prothorax distinctly broader than long, almost evenly narrowed from base to constricture just before apex; disc impunctate in center, hardly grooved medially, obliquely grooved and punctured at each side of base, concave and densely punctured on each side. Elytra long, subparallel-sided; each with three longitudinal costæ and eight to eleven rows of heavy punctures: third costa subobsolete along central portion, second interspace with three, and in part four, rows of punctures basally, and outermost with one extra row near base each with two rows from before middle to near apex. Ventral surfaces almost impunctate except near apex of abdomen. Length 7.4 mm.; breadth 2.6 mm.

Holotype, No. 4697, Calif. Acad. Sci., Ent., Mt. Murud, Borneo, Mjöberg collection, W. W. Funge bequest.

Differs from *A. jacobsoni* Uhmann in being smaller, in having the prothorax and elytra both nearly unicolorous and lacking black markings, the ventral surfaces purplish brown instead of black, the third antennal segment shorter than fourth and fifth combined, fourth to tenth segments not equal in length and thickness, each elytron with four rows of punctures for a short distance near base of second interstice, etc.

14. Agonia xanthosticta (Gestro), 1897

A specimen is in the collection from Kuching, Borneo, Mjöberg collection.

15. Agonia (Agoniella) vandepolli (Gestro), 1897

Six examples were taken at Subig Bay, Luzon, P. I., May 1907, by J. C. Thompson.

16. Gonophora albitarsis Gestro, 1910 ?

Two specimens from the Mjöberg collection labelled "Baram Rov" are in the Academy. These are probably from Borneo.

17. Gonophora apicalis Baly, 1858

One specimen was taken at Dolores, Luzon, P. I., May 17, 1930.

18. Gonophora borneana Gressitt, new species

Moderately broad, slightly widened posteriorly. Largely metallic greenish, blue or purplish; head green above, purplish brown on frons and labrum; antennæ greenish black basally, pitchy brown beyond middle and whitish testaceous on last two segments; prothorax green, somewhat bronzy along central portion; scutellum blackish; elytra frosted green along suture and on parts of base, bluish along external margins, bluish black on central portions of discs, and purplish on raised costæ; ventral surfaces purplish black; legs pitchy with greenish or bronzy reflections.

Head convex and slightly uneven above, hardly punctate. Antennæ three-fifths as long as body, slightly thickened beyond middle; scape a little longer and thicker than second segment; third almost as long as preceding two combined and subequal to each of following two; sixth to tenth shorter, subequal. Prothorax not quite twice as broad as long, a narow transverse groove near apex and base; sides sinuate and feebly dentate, widest just before middle, suddenly constricted before apex; disc impunctuate on anterior median portion, narrowly grooved from just before center to near base, deeply impressed in an oblique direction on each side and bearing irregular coarse punctures. Elytra slightly sinuate laterally, each with three costæ, the inner two strongly raised and the third nearly obsolete; punctures in seven rows at middle, last two interspaces merged and with three punctures, second interspace with three rows at base; apices without distinct teeth. Abdominal sternites in part finely puctured. Length 6.5 mm.; breadth 2.65 mm.

Holotype, No. 4794, Calif. Acad. Sci., Ent., Mt. Murud, Borneo, Mjöberg collection; W. W. Funge bequest.

Differs from *G. chalybeata* Baly in being largely green or blue-green above and purplish black beneath, in having the prothorax much broader than long, the elytra with the third costa almost lacking, with three puncture-rows in the last two interstices together, and with the apices practically untoothed.

19. Gonophora hæmorrhoidalis (Weber), 1801

One specimen is in the Academy from Mt. Poi, Sarawak, Borneo.

20. Gonophora xanthomelæna (Wied.), 1823

One specimen was collected at Siborangit, Borneo.

Tribe Hispini

21. Monochirus Mœrens (Baly), 1874

A large series of specimens was taken at Nanking, Kiangsu Prov., E. China, May 4, June 10, 20 and September 14, 1923, one at Nantung, E. China, May 9, 1932, and several at Unzen Hot Springs, Kyushu, S. Japan, July 8-12, 1923, all by Dr. Van Dyke.

22. Monochirus sp.

A few specimens were taken on Mt. Pina Tuba, Philippine Is., April 1907, by J. C. Thompson. These may represent the form recorded from Luzon as *M. callicanthus* (Bates), but they appear to differ at least subspecifically from typical Formosan material.

23. Rhadinosa nigrocyanea (Motsch.) 1861

Several specimens were collected at Nikko, Honshu, Japan, July 30, 1923, by Dr. Van Dyke, and one at Ikao, Honshu, in August 1909, by Dr. Thompson.

24. Dactylispa angulosa (Solsky), 1872

A large series was taken at Nanking, Kiangsu Province, E. China, April 25, 30, May 4; and several at Hangchow, Chekiang, E. China, May 18, 1923, by Dr. Van Dyke; a few examples were taken at Mokan Shan, Chekiang, in August 1927, by Mrs. Dora E. Wright. Some additional specimens are in the Academy from Nagoya, Honshu, Japan, May 15, 1909.

25. Dactylispa cladophora (Guerin), 1841

One example was taken at Alabang, Luzon, P. I., May 29, 1929.

26. Dactylispa corpulentina Uhmann, 1927

A few specimens were taken on the Island of Formosa by Dr. J. C. Thompson.

27. Dactylispa dimidiata (Gestro), 1885

Two specimens from Kota Tjane (Borneo?) are in the Mjöberg collection.

28. Dactylispa sauteri Uhmann, 1927

Several examples were taken by Dr. J. C. Thompson in Formosa.

29. Dactylispa subquadrata (Baly), 1874

Several were taken at Nanking, Kiangsu, E. China, April 30, 1932, E. C. Van Dyke, and Nagoya, Japan, May 15, 1909.

30. Dactylispa vittuta (Chapuis), 1876

Ten specimens were collected at Subig Bay, Luzon, May 1907, and two at Mt. Pina Tuba, 5,600 ft. alt., Luzon, April 1907, by J. C. Thompson.

31. Platypria echidna Guerin, 1840

A single specimen is in the collection, labelled "Loo Choo, China, May 1910, collected by J. C. Thompson." This is probably from Okinawa Island in the central Ryu Kyu Archipelago. The species is new to the Ryu Kyu Islands, and the genus is new to the Japanese Archipelago.

SUBFAMILY CASSIDINÆ

Tribe Priopterini

32. Hoplionota sp.

Two specimens are in the collection from Luzon: one from Subig Bay, May 1, 1907, J. C. Thompson, the other from Alabang, June 11, 1930.

33. Calopepla leayana insulana Gressitt, 1938

A paratype is in the Van Dyke collection, taken at No-kyu-chun, Hainan Island, March 22, 1936.

34. Prioptera angusta Spaeth, 1914

One specimen, taken at Kuraru, Koshun, S. Formosa on June 10, 1932, is in the Van Dyke collection.

35. Prioptera chinensis (Fabr.), 1798

Several were collected at Hangchow, Chekiang, E. China, May 23, 1923, by Dr. Van Dyke.

36. PRIOPTERA IMMACULATA Wegener, 1881

One specimen was taken at Alabang, Luzon, P. I., June 11, 1930.

37. PRIOPTERA MACULIPENNIS REDUCTA Gressitt, 1938

One specimen collected by the writer at Ta-hian, C. Hainan Id., June 12, 1935, is in the Van Dyke collection.

38. PRIOPTERA SINUATA (Olivier), 1790?

A specimen was taken at Alabang, Luzon, P. I., June 11, 1930.

39. PRIOPTERA WHITEI TRABEATA Fairmaire, 1888

Mokan Shan, Chekiang; Cha-yuan, Chekiang.

40. MEGAPYGA COERULEOMACULATA Boheman, 1850

One example was collected at Alabang, Luzon, P. I., June 11, 1930.

41. MEGAPYGA TERMINALIS Boheman, 1862

One specimen from Alabang, Luzon, June 11, 1930, is in the collection.

TRIBE ASPIDOMORPHINI

42. ASPIDOMORPHA DIFFORMIS (Motsch.) 1860

Specimens were taken at Hangchow, Chekiang, E. China, May 19, and Weisohn, August 31, and Chin San, September 10, Manchuria, 1923, by Dr. E. C. Van Dyke; additional specimens were collected at Mokan Shan, Chekiang, September 9, 1927, by Mrs. Dora E. Wright.

43. ASPIDOMORPHA DORSATA (Fabr.), 1787

One specimen is in the Van Dyke collection, taken at Ta-hian, Hainan Id., June 17, 1935, by J. L. Gressitt.

44. ASPIDOMORPHA FURCATA (Thunb.) 1789

A few were taken at Riv de Quangtri, Annam, Indo-China, April 14-15, 1927, Mrs. Dora E. Wright; one was collected on Hong Kong Id. in October 1895; one at Kandy, Ceylon, by Albert Koebele; and another at Chung-kon, Hainan Id., July 19, 1935, J. L. Gressitt.

45. Aspidomorpha fuscopunctata Boheman, 1854

Riv de Tchepone, Annam; Subig Bay, Luzon; Liamui, Hainan Island.

46. Aspidomorpha indica Boheman, 1854

One specimen was taken at Riv de Quangtri, April 14, and another at Hue, May 15, Annan, Indo-China, 1927, by Mrs. Dora E. Wright.

47. Aspidomorpha miliaris (Fabr.), 1775

One example was taken at Riv de Hue, Annam, Indo-China, May 16, 1927, Dora E. Wright; another at Ta-hian, Hainan Id., June 19, 1935, Gressitt; six at Buitenzorg, Java, April 8, 1908, E. Cordier; four at Djirak, near Palembang, Sumatra, April 1929, G. W. Heid; three at Subig Bay, Luzon, May 1900, J. C. Thompson; and three at Manila.

48. Aspidomorpha sanctæ-crucis (Fabr.), 1792

One specimen is in the Academy labelled merely "India, Koebele collection"; two were taken on Hainan Id. by the writer: one at Tai-pin (Dwa-bi), July 22, and one at Liamui, August 1, 1935; three specimens, perhaps from Borneo, are from the Mjöberg collection.

49. Aspidomorpha sanctæ-crucis fraterna Baly, 1863

Two specimens were collected at Hue, Annam, Indo-China, May 15, 1927, by Mrs. Dora E. Wright.

50. Laccoptera quadrimaculata bohemani Weise, 1910

Specimens were taken at the following localities: Hangchow, Chekiang, May 23, 1923, E. C. Van Dyke; Mokan Shan, Chekiang, September 9-23, 1927, Dora E. Wright; Foochow, Fukien, 1926, C. R. Kellogg; Hong Kong, J. Koebele; Taipeh (Taihoku), Formosa, May 9, 1909, J. C. Thompson; Riv de Hue, Annam, Indo-China, March 16, 1927, Dora E. Wright.

51. Laccoptera quatuordecimnotata Boheman, 1855

Two specimens were collected on Ceylon by Albert Koebele.

52. LACCOPTERA TRIDECIMPUNCTATA (Fabr.), 1801

Three specimens were taken at Subig Bay, Luzon, P. I., by Dr. J. C. Thompson, May 1907.

53. LACCOPTERA VIGINTISEXNOTATA PUNCTICOLLIS Gressitt, 1938

Six specimens were taken at Riv de Quangtri, Annam, May 3-5, 1927, by Mrs. Dora E. Wright.

TRIBE COPTOCYCLINI

54. THLASPIDA JAPONICA Spaeth, 1914

Specimens were taken at Hangchow, Chekiang, May 19, 1923, E. C. Van Dyke; Mokan Shan, Chekiang, August 20-September 23, 1927, Dora E. Wright; Kwanhsien, Szechuan, W. China, July 11, 1928; Nikko and Miyanoshita, Honshu, Japan, August 1895, Albert Koebele; Unzen Hot Springs, Kyushu, July 8-12, E. C. Van Dyke; Taipeh (Taihoku), Formosa, May 2-9, 1909 and Keelung (Kiirun), Formosa, April 21, 1909, J. C. Thompson.

55. METRIONA CIRCUMDATA (Herbst), 1799

Four were collected on Yakushima, south of Kyushu, Japan, April 1912, and several on Ishigaki Id., S. Ryu Kyu Is., May 1910, J. C. Thompson; one is labelled "Keelung, China, 1910, coll. by Victor Kuhne" (probably Kiirun, Formosa); several were taken at Swatow, S. China, and one on Hong Kong, by Albert Koebele; one at Riv de Tchepone, April 9, and one at Riv de Quangtri, April 14, Annam; three from Manila were presented by R. Hopping; and one was collected at Manila on February 19, 1929, by E. G. Linsley.

56. METRIONA SIGILLATA (Gorham), 1885

One was taken at Miyanoshita, Honshu, Japan, June 1, 1895, A. Koebele; another is labelled "Japan; Koebele"; and one was taken at Mokan Shan, Chekiang, E. China, September 24, 1927, Dora E. Wright.

57. METRIONA THAIS (Boheman), 1862

Several were collected at Hangchow, Chekiang, May 19-June 2, 1923, E. C. Van Dyke; and one at Mokan Shan, August 28, 1927, Dora E. Wright.

Tribe Cassidini

58. Cassida (Deloyala) vespertina Boheman, 1862

Five were taken at Mokan Shan, Chekiang, August 25, September 24-28, 1927, Dora E. Wright; one at Hangchow, Chekiang, May 25, 1932, E. C. Van Dyke; and another at Kwanhsien, Szechuan, W. China, July 10, 1928.

59. Cassida (Cassida) fuscorufa Motsch., 1866

Several were taken at Nanking, April 30, May 4, June 2 and 25, and a few at Hangchow, May 19, 1923, by Dr. E. C. Van Dyke; one is labelled "Japan; Koebele".

60. Cassida (Cassida) japana Baly, 1874

One example was collected at Nagasaki, Japan, July 6, 1923, by Dr. Van Dyke.

61. Cassida (Cassida) lineola Creutzer, 1799

Several were taken at Moji, Kyushu, July 7, and Kyoto, July 16, Japan, 1923, E. C. Van Dyke; one at Harada, Kobe, Japan, June 13, 1911, J. E. A. Lewis; one at Tunglu, China, March 30, 1926, and two at Mokan Shan, Chekiang, September 16 and 28, 1927, Dora E. Wright.

62. Cassida (Cassida) mongolica Boheman, 1854

One was collected at Tung-ko Forest Station, Kiangsu, China, June 11, 1923, E. C. Van Dyke.

63. Cassida (Cassida) nebulosa Linn., 1758

One specimen was taken at Otaru, Hokkaido, Japan, August 1910, J. C. Thompson, and another at Mukden, Manchuria, August 14, 1923, E. C. Van Dyke.

64. Cassida (Cassida) obtusata Boheman, 1854

Three examples were collected on Hong Kong Id., October 1895, Albert Koebele; two were taken at Riv de Tchepone, Annam, April 9, 1927, Dora E. Wright; one is labelled "China, Koebele"; one was collected at Manila in February 1926; and one was taken at Alabang, Luzon, June 11, 1930.

65. CASSIDA (CASSIDA) PIPERATA Hope, 1842

A few were taken at Nanking, Kiangsu, May 4 and June 19, 1923, E. C. Van Dyke; one was taken at Kobe, Japan, in February 1909, J. C. Thompson.

66. CASSIDA (CASSIDA) TRIANGULUM (Weise), 1897

One example was taken at Riv de Quangtri, Annam, Indo-China, April 14, 1927, Dora E. Wright.

67. CHIRIDA PUNCTATA (Weber), 1801

Several specimens were collected at Riv de Tchepone, April 9, two at Riv de Quangtri, April 14, and one at Riv de Hue, March 16, 1927, Dora E. Wright. One was collected at Kota Tjane, Borneo(?), Mjöberg collection, W. W. Funge bequest.

68. CHIRIDA SCALARIS (Weber), 1801

A single specimen was collected at Riv de Hue, Annam, Indo-China, March 16, 1927, by Mrs. Dora E. Wright; two were taken at Djirak, near Palembang, Sumatra, April 1929, by G. W. Heid.

69. HEBDOMECOSTA REITTERI Spaeth, 1915

One specimen was collected at Hangchow, Chekiang Prov., E. China, May 19, 1923, by Dr. E. C. Van Dyke.

APHIDS ON SPIRÆA

(Homoptera, Aphididæ)

The fact that aphids may indirectly be the cause of much annoyance in the house was recently observed in the case of the green citrue aphid, *Aphis spiræcola* Patch on its native host, the bridal wreath shrub, *Spiræa*, which is commonly planted around houses in Los Angeles. Many species of flying insects are attracted to the honey dew, including the house fly, the stable fly, the green bottle fly, fruit fly and numerous others. It has been observed several times that if the bridal wreath shrub was not cared for, the inhabitants of the house suffered no little discomfort from these household pests.—N. Stahler.

The Puget Sound Entomological Society

Entomological workers in western Washington gathered at the University of Washington, Seattle, on Friday, March 10, 1939, and organized The Puget Sound Entomological Society. The objectives of the society are to promote the study of insects, arachnids, and terrestrial arthropods in western Washington, and to promote the mutual welfare of the members through the exchange of ideas at meetings and field trips. Membership is open to persons of good character who are engaged in entomological activities. The society will hold two regular meetings annually, in February and October, the precise time and place to be determined by the Executive Committee which is composed of three elective officers. The present officers are: Professor Trevor Kincaid, University of Washington, president; Mr. S. E. Crumb, Entomologist, Bureau of Entomology and Plant Quarantine, vice-president, and Dr. E. P. Breakey, Entomologist, Western Washington Experiment Station, secretary-treasurer. Special meetings may be called by the Executive Committee at such time and place as it may determine.

The Organization of the Puget Sound Entomological Society was the result of a movement initiated in the fall of 1938 by Dr. Breakey. Thirty-two persons with entomological interests, both professional and hobby, gathered in Puyallup on November 18, 1938. Many spent the afternoon visiting the Western Washington Experiment Station, and the U. S. Bureau of Entomology and Plant Quarantine Field Stations in Puyallup and Sumner. In the evening the group gathered for dinner, after which a discussion was held on the desirability of forming a permanent organization. Dr. Breakey was elected provisional chairman and Mr. Charles F. Doucette, Bureau of Entomology and Plant Quarantine, Sumner, provisional secretary. The chairman appointed a committee on organization: Prof. Melville H. Hatch, University of Washington, chairman, to present a constitution and by-laws for discussion and approval at the next meeting. A nominating committee, Mr. W. W. Baker, Bureau of Entomology and Plant Quarantine, chairman, was also appointed.

The October meeting is to be held in Puyallup. A program is being formulated and some good papers are anticipated.—E. P. Breakey, Secretary-Treasurer.